

Appln No. 09/966,572
Amdt date December 29, 2003
Reply to Office action of September 25, 2003

REMARKS/ARGUMENTS

In response to the Office action dated September 25, 2003, applicants have amended claims 1, 3, 4, 6, 7, 9-11, 13, 15-20 and 23-28. Claims 5, 12 and 21 have been cancelled. Claims 1-4, 6-11, 13-20 and 22-28 remain in this application.

In the Office action, claims 1-6 were rejected as anticipated by Amatucci et al. According to the examiner, Amatucci et al. disclose a positive electrode comprising LiMn_2O_4 coated with a layer of boron oxide, lithium hydroxide, aluminum oxide, or mixtures thereof. Alternatively, claims 1 and 3-6 are rejected as anticipated by Howard et al. According to the examiner Howard et al. teach a $\text{Li}_{1+x}\text{Mn}_{2-x}\text{O}_4$ spinel with a protective coating of metal oxides. However, independent claim 1 has been amended to recite a positive active material comprising a core of lithiated compound with "two metal oxide layers formed on the core." Nowhere do Amatucci et al. or Howard et al. teach or suggest such a two layer structure formed over the core. Consequently independent claim 1 is allowable over the prior art, as are dependent claims 2-4 and 6.

The examiner also rejected independent claim 7 as anticipated by Wang. As amended, Claim 7 is directed to a positive active material comprising a core comprising a lithiated compound, and "at least two surface-treatment metal oxide layers formed sequentially on the core." The examiner appears to be citing Wang for the teaching that a $\text{Li}_{1+x}\text{Mn}_2\text{O}_4$ spinel may be coated with a metal hydroxide which can then optionally be converted to a carbonate by treatment with either a carbonate or carbon dioxide gas. However, to the extent that Wang may disclose a two-step process, it appears from Wang that the coated spinel should include either a hydroxide coating or a carbonate coating, but not both. Consequently, because Wang discloses just one layer, the lithiated compound of claim 7 which includes two layers of metal compounds is not anticipated by Wang. Moreover, claim 7 not only recites that two separate layers are sequentially formed on the lithiated compound, as amended, it recites that the layers comprise metal oxides. Nowhere does Wang teach or suggest the application of one or more layers of metal oxides. Therefore, claim 7 is allowable over the cited art, as are dependent claims 8-11.

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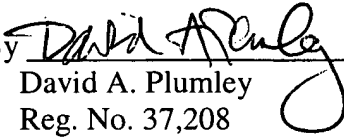
Method claims 13, 14 and 17-21 were similarly rejected as anticipated by Wang. However, by incorporating certain steps of dependent claim 21, independent method claim 13 has been amended to recite a method for preparing a positive active material by which a lithiated compound is coated with two metal oxide layers. As set forth above, while Wang may disclose a two-step process for applying a single coating to a spinel, Wang does not disclose a process such as that claimed in claim 13 in which two layers are applied. Furthermore, even if Wang could be understood as disclosing the application of two separate coatings, the coatings of Wang are hydroxides or carbonates, not metal oxides as set forth in claim 13. Consequently, the steps of independent claim 13 are neither taught nor suggested by Wang or the other prior art, and therefore, claim 13 is allowable over the prior art as are dependent claims 14-20 and 22.

Claims 23-25 were rejected as obvious over Wang in view of Howard et al., and claims 26-28 were rejected as obvious over Wang in view of Howard et al., and further in view of Amatucci et al. According to the examiner, Wang teaches that coating and heating improves performance, and therefore, it would be obvious to repeat the coating and heating steps. Applicants respectfully assert that Wang neither teaches nor suggests multiple coating and heating steps such as those set forth in independent claim 23. According to Wang, improved performance is obtained by forming carbonates on the surface of a spinel by first treating the spinel with a hydroxide, and then treating it with a carbonate. From the teaching of Wang, once a layer of carbonate has formed on the surface of the spinel, the benefit suggested by Wang would have been achieved, and there would be little need for repeating the steps. Consequently, Wang fails to teach or suggest the invention claimed by independent claim 23 or corresponding dependent claims 24-28. It should be further noted that claim 23 has been amended to specifically recite that the two layers over the core are metal oxides. As pointed out above, Wang merely teaches that a single layer of hydroxide or carbonate should be formed over the spinel rather than teaching the use of multiple layers of metal oxides.

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For the reasons stated above, applicants submit that the pending application is now in condition for allowance. However, if there are any remaining issues that can best be addressed by telephone, the examiner is asked to contact applicant's attorney at the number below.

Respectfully submitted,
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